FACTS ON FILE

EMSP

Environmental Management Science Program

Project Highlights

The Environmental Management Science Program (EMSP) is funding basic research projects focused on solving the most difficult problems that threaten the closure plans of DOE sites. This fact sheet highlights just one.

Genetic Engineering of a Radiation-Resistant Bacterium for Biodegradation of Mixed Wastes

The mixture of toxic chemicals, heavy metals, halogenated solvents and radionuclides in many DOE waste materials presents a challenging problem for separating the different species and disposing of individual contaminants. A microbiological treatment system is an attractive possibility for separation and treatment. Systems are available in bacteria for detoxifying halogenated organics and toxic metals such as mercury, and theoretically these could be used to selectively remove these classes of compounds from mixed wastes.

The aim of this work is to engineer Deinococcus radiodurans into a detoxifier for bioremediation of complex waste mixtures, containing heavy metals, halo-organics, and radionuclides, making use of its ability to be biologically active in environments where it will be exposed to high levels of radiation. Deinococcus radiodurans, a natural soil bacterium, is the most radiation resistant organism yet discovered. This work aims at cloning and expressing several broad spectrum oxygenases and heavy metal resistance determinants and testing survival and activities of these strains in artificial mixtures of contaminants, designed to simulate DOE mixed waste streams.

Location: University of Washington

Year of Award: 1997

Amount of Award: $422,398

Office of Environmental Management (EM) Problem Area: Mixed Waste

Office of Science (SC) Scientific Category/Sub-Category: Microbial Science/Microbial Genetics and Instrumentation

Research Value/Impact: To date, project researchers have constructed a number of integration vectors. Derivatives of these vectors, carrying reporter genes for the selection of promoter fragments, are currently being developed. In addition, several chromosomal fragments were cloned that will be tested for promoter activity by primer extension and Northern analysis.

Lead Principal Investigator:
Mary E. Lidstrom
University of Washington
(206) 616-5282

More Information on the Web:
http://www.em.doe.gov/science or
http://www.id.doe.gov/emsystems/emsp